

A Watershed Model for the South Fork Flathead River Basin Upstream from Hungry Horse Dam, Montana

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The Bureau of Reclamation (BOR) plans to develop a water-resource management model for the Clark Fork of the Columbia River basin. This model could be used to optimize reservoir operations to meet increasing Montana water needs while still fulfilling downstream requirements for power generation and instream flow. As a first phase for this work, the U.S. Geological Survey (USGS) is developing a watershed model for the South Fork Flathead River, upstream from Hungry Horse Dam. The BOR plans to use this model to estimate daily values of unregulated streamflow at selected locations in the South Fork Flathead River basin.

The watershed model is being constructed using the USGS Modular Modeling System (MMS), an integrated system of computer software that provides a framework for the development and application of models to simulate different water, energy, and biogeochemical processes. For this study, MMS is being used to link modules from the USGS Precipitation-Runoff Modeling System (PRMS) to construct the watershed model. PRMS is a distributed watershed model that simulates precipitation- and snowmelt-driven movement of water through a basin via overland flow, interflow, and base flow. The resulting watershed model is being calibrated and tested by simulating daily streamflow and snowpack characteristics and comparing the results with observed data. The calibrated and tested watershed model can be used to simulate the hydrologic response of the basin for various climatic scenarios.

MMS will be linked with a hydrologic database which, in turn, will connect with Riverware, a river-and-reservoir management model developed and used by BOR. These models will be part of the BOR's Decision Support System (DSS) for the South Fork Flathead River system. This DSS will allow the BOR to forecast hydrologic conditions in the South Fork Flathead River basin using the most up-to-date information and will enable water-resource managers to optimize reservoir operations at Hungry Horse Dam to meet downstream flow requirements.